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AUTHOR Marcinkiewicz, Henryk R.
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ABSTRACT

Despite increased availability and support for computers, relatively few teachers have integrated them into their teaching. This paper summarizes four studies that studies were conducted, two with independent groups of practicing teachers and two conducted longitudinally with a single group, first when they were preservice undergraduate teachers, and then later after they had taught professionally for a year. One purpose of these studies was to identify levels of computer use among practicing teachers and any change from expected to actual levels of use among the preservice-to-novice group. Another purpose was to identify variables of internal motivation as predictors of teachers' computer use. Levels of computer use among teachers were not high. Preservice educators' expectations of computer use were very high but dropped after one year of professional teaching. Perceived relevance of and self-competence in computer use were strong predictors; however, when "Subjective Norms" was included in the calculation, it emerged as the predictor which superseded all others. In order for teachers to adopt computers, there needs to be a perception generated by the professional environment that computer integration is expected. This can be established by modeling use by administrators, colleagues, students, and the profession. A work environment would be equipped and faculty training and support would be available. (Contains 27 references.) (Author/SWC)

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Title:

Motivation and Teachers' Computer Use

Author:

Henryk R. Marcinkiewicz, Ph.D.
University of South Dakota

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Abstract

Four studies were conducted, two with independent groups of practicing teachers and two conducted longitudinally, once with a single group as preservice undergraduate teachers, and again subsequently after they had taught professionally for a year. A purpose of these studies was to identify levels of computer use among practicing teachers and change from expected to actual levels of use among the preservice-to-novice group. Another purpose was to identify variables of internal motivation as predictors of teachers' computer use. Levels of computer use among teachers were not high. Preservice students' expectations of computer use were very high then dropped after one year of professional teaching. Perceived relevance of and self-competence in computer use were predictors; when subjective norms was included in the calculation it emerged as the sole predictor.

Introduction

Underutilization of computers for teaching has occurred in spite of two prevailing conditions that would seem to promote their use. First, there is much support for the opinion that educational computer technology could significantly improve the educational system (National Task Force on Educational Technology, 1986; Shanker, 1990; Sheingold & Hadley, 1990; United States Office of Technology Assessment [OTA], 1988). Secondly, the microintensity level—ratio of computers per learner has improved from 112.4:1 in 1983 to 18.9:1 in 1992 (OTA, 1988; Market Data Retrieval, 1992). Yet, despite increased availability and support for computers, relatively few teachers have integrated them into their teaching. A survey of teachers who were exceptional users of computers for teaching averaged only about one such teacher per school (Sheingold & Hadley, 1990). This paucity of integration occurred even though the availability of computers (59) in the schools surveyed was more than double the average number of computers (26) available for schools in the United States (Becker, 1989). Extraordinary abundance of computers was not matched by an abundance of extraordinary users of computers. The result of this imbalance is that computers are underutilized.

These studies were undertaken to identify what teacher variables might predict computer use. First, computer use was classified as a process of the adoption of innovation (Hall, 1982; Rogers 1962, 1983; Rogers & Shoemaker, 1971) or more specifically Instructional Transformation (Hooper & Rieber, 1995; Rieber & Welliver, 1989; Welliver, 1990).

Secondly, teachers' computer use was examined for the influence of personal variables to computer use. In a broad study of the implementation of innovation in education, this class of variables was excluded (Berman & McLaughlin, 1978). Yet, information about personal variables may be the most valuable for influencing behavior or performance (Coovert & Goldstein, 1980; Gallo, 1986; Jorde-Bloom & Ford, 1988). Sheingold and Hadley's survey (1990) suggested that teachers who were exceptional users of computers for teaching were also highly motivated. Because of the prominence of motivation as a personal variable relative to computer use, it was the focus of the studies. From within the broad construct of motivation, Expectancy Theory (Vroom, 1964) and subjective norms guided the selection of variables (Ajzen & Fishbein, 1980; Fishbein, Jaccard, Davidson, Ajzen, & Loken 1980)

Problem

Expectations for teachers to integrate educational computing into teaching are high. Levels of integration among teachers are low. Educational computing is underutilized.

Questions

1. What are the levels of computer use among teachers?
2. What are the changes from student-teachers expectations of computer use after one year of professional teaching?
3. What internal motivating variables predict computer use by teachers?

Participants/4 Studies

Four studies were conducted: two independent groups of practicing teachers and group studied twice longitudinally. The latter group first participated as undergraduate preservice teachers. Then, they participated after one year of professional

teaching. Participants with an elementary school focus were selected to control for the prevalence of computer use in certain subjects as might be the case with secondary or post-secondary teachers.

Longitudinal Studies

a. Preservice undergraduates (n = 167)
b. Novice teachers (same as group 'a' but after 1 year of teaching) (n = 100)

Independent Studies

a. Practicing teachers (n = 170)
b. Practicing teachers (n = 138)

Variables

Criterion

- Levels of Computer Use

Independent

- Subjective norms (only for the last study)
- perceived relevance of computers
- self-competence in using computers
- innovativeness
- teacher locus of control

Demographics

- age
- gender
- computer experience

Instruments

a. Levels of Computer Use scale (LCU) (Marcinkiewicz & Welliver, 1993)
b. subjective norms scale (Fishbein, Jaccard, Davidson, Ajzen, I., & Loken, 1980; MacDonald, 1991; Marcinkiewicz, 1994)
c. survey for perceived relevance and self-competence
d. Innovativeness Scale (Hurt, Joseph, & Cook, 1977)
e. Teacher Locus of Control (Rose & Medway, 1981, 1982); Teacher Role Survey (Maes & Anderson, 1985)

Procedures

Participants completed questionnaires composed of the above measures. The instructions for the questionnaire for the preservice undergraduates were worded to elicit their expectations. The preservice sample was also split in its use of the two locus of control measures. Scores were then standardized as T scores.

Analysis

Levels of use were scored with the LCU scale. Exploratory intercorrelations were calculated. Logistic regressions were calculated to determine the predictor variables.

Results

For all studies, perceived relevance, self-competence, and innovativeness were correlated; however, for the study with the novice teachers the correlation between self-competence and perceived relevance was double that of previously scored.

The variables that were identified as predictors are listed in Table 2. The chronological order in which the studies were conducted is listed in Table 2 from left to right. The only variable in the last study conducted that was identified as contributing to the prediction of teachers' computer use was subjective norms.

Table 1

Levels of Computer Use

	Practicing 1	Practicing 2	Avg. % of Practicing	Preservice	Novice
Computer Use					
Nonuse	43.5	31.0	37.2	2.7	39
Utilization	48.5	66.0	57.2	84.0	60
Integration	8.0	3.0	5.5	13.3	1

Table 2

Predictors of Computer Use

	Practicing 1	Preservice	Novice	Practicing 2
self-competence	$p < .000$	$p < .04$	N	N
perceived relevance	N	$p < .005$	N	N
innovativeness	$p < .24$	N	N	N
teacher locus of control	N	N	$p < .03$*	N
subjective norms	X	X	X	$p < .01$

* Teacher Locus of Control for Preservice predicted Novices use.
X Subjective norms was not included in these studies.
N No Significant Difference

Discussion

In comparison with the expectations of the preservice teachers, the levels of computer use of among practicing teachers is low. However, while the preservice teachers had very high expectations of computer use, after they had taught for a year their levels of use approached the average levels of use of the practicing teachers. This may be attributable to regression to the mean behavior, ambitious undergraduate expectations, or the effects of an excellent undergraduate program. Still, the differences in use between the two groups were statistically significant.

For all the studies except for the Novice round of the longitudinal one, there is a pattern from among the personal variables that predict computer use. Self-competence and perceived relevance are highly correlated. This correlation is most dramatic between rounds 1 and 2 of the longitudinal study when the correlations nearly double in strength. Self-competence emerges as a predictor more often than do perceived relevance and innovativeness but since they are also correlated in different studies, it may be that together they are indicators of motivation to computer use. The necessity of feeling competent in the use of computer technology is intuitively appealing and is also predicted by expectancy theory. The increased strength of correlation between self-competence and perceived relevance during the Novice Study suggests the importance of these variables; their failure to predict computer use may be due to the increase in nonuse since the first round. Perhaps most compelling is the emergence of subjective norms as a predictor superior to either of the previously identified ones. While subjective norms reflects one's personal motivation it also reflects motivation based on one's perceptions of others' expectations—akin to phenomena such as peer pressure, introjected regulation, or values building. This result is consistent with the view that the expectations of a teacher's culture as embodied in one's administrators, colleagues, students and professional societies significantly influence a teacher to use computers.

Availability

The availability of computers is sometimes suggested as a factor in determining teachers use. These studies focused on personal motivation. It is important to consider availability and motivation as complementary and not as mutually exclusive. A model for competent human behavior was suggested by Gilbert (1978) in which the three dimensions of information, motivation, and equipment are crossed with external and internal perspectives. Gilbert's model provides a context which encompasses the need for the availability of computer equipment; it also acknowledges motivation. In sum, teachers will not adopt computers unless all dimensions are satisfied. When considering the dimension of motivation, subjective norms is predictive of teachers computer use.

Implications

In order for teachers to adopt computers, there needs to be a perception generated by the professional environment that computer integration is expected. This can be established by modeling use by administrators, colleagues, students, and the profession. A work environment would be equipped and faculty training and support would also be available.

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